Fundamentals of Molecular Virology 2nd Edition Acheson Test Bank

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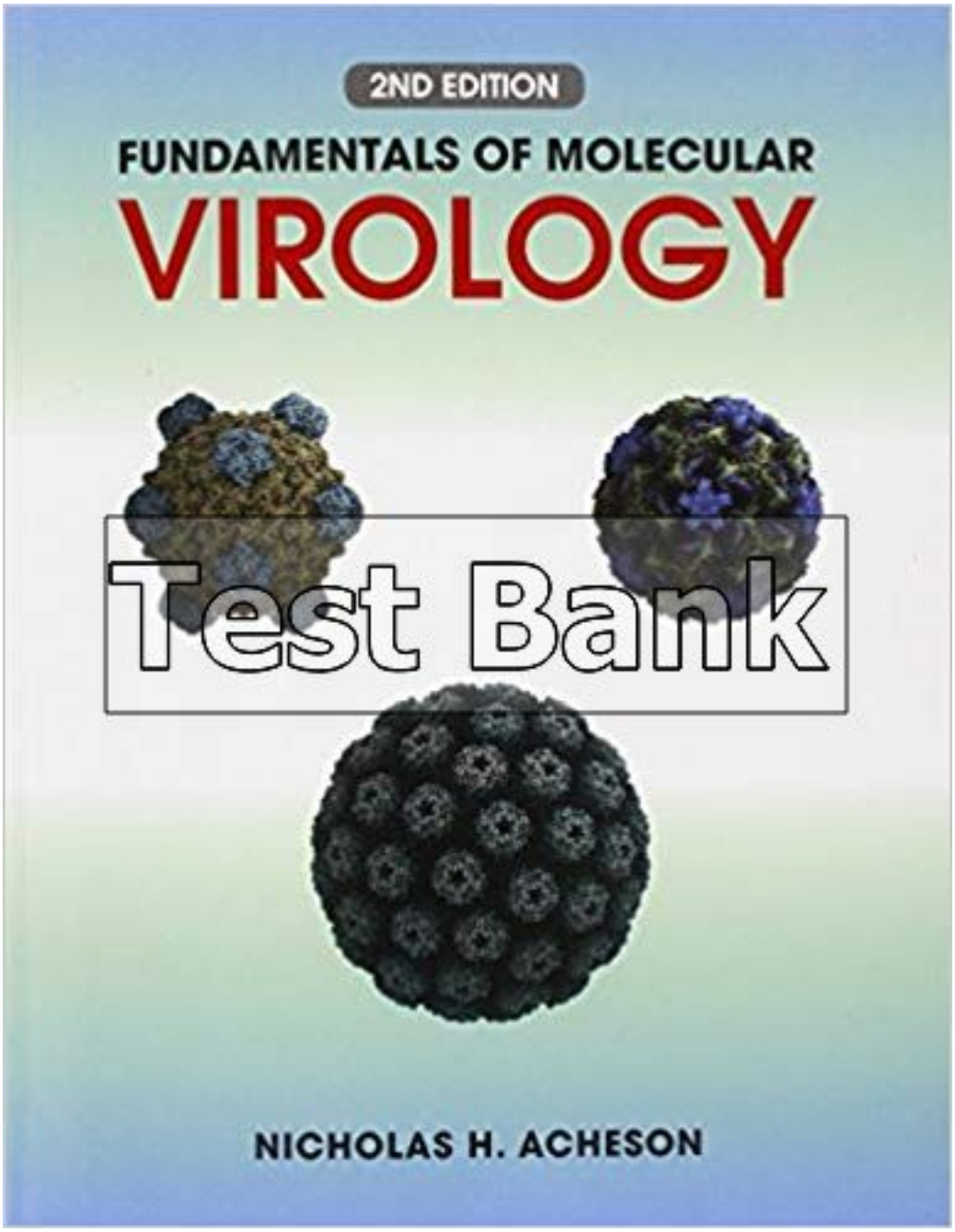

Chapter Number: 01

Question type: Multiple Choice

1) Which of the following terms describes the protein shell that surrounds the viral genome?

a) capsid
b) envelope
c) matrix
d) virion
e) capsomere

Answer: a

2) Which of the following would not be a nucleic acid form found in a viral genome?

a) dsDNA
b) ssDNA
c) dsRNA
d) ssRNA
e) an RNA:DNA hybrid

Answer: e

3) Which of the following is an enzyme that most RNA viruses encode in their genome?

a) DNA-dependent-RNA-polymerase
b) RNA-dependent-RNA-polymerase
c) DNA-dependent-DNA-polymerase
d) DNA-dependent-RNA-polymerase
e) RNA-dependent-protein-synthetase

Answer: b

4) Viruses play a major role in the ecology of the ocean by doing which of the following?

a) By infecting photosynthetic bacteria and increasing their growth.
b) By infecting harmful bacteria found in the ocean and limiting their growth.
c) By killing off fish and preventing them from becoming too plentiful.
d) By lysing unicellular organisms and releasing carbon and oxygen back into the ocean.
e) All of the above statements are correct.

Answer: d

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5) If you wanted to show that an infectious agent is a virus, what experiment could you do?

a) Show that the agent can be seen under a light microscope.
b) Show that agent contains a lipid membrane.
c) Show that the agent can form single colonies on an agar plate.
d) Show that the agent can be diluted and can still cause disease in an animal.
e) Show that the agent can pass through a porcelain filter and is still infectious.

Answer: e

6) What does the word “virus” mean in Latin?

a) infectious agent
b) liquid
c) poison
d) death
e) disease

Answer: c

7) The word “phage” is a shortened version of the name of a virus that can infect which type of organism?

a) bacterial cell
b) human cell
c) eukaryotic cell
d) plant cell
e) inset cell

Answer: a

8) The study of which group of viruses led to the discovery of cellular genes that can promoter cancer in animal cells?

a) papillomaviruses
b) retroviruses
c) adneoviruses
d) polyomaviruses
e) picornaviruses

Answer: b

9) When doing a plaque assay with human or animal cells, a layer of nutrient media mixed with agar is put on top of the cells after they have been infected with the diluted virus. What is the major purpose of this agar layer?

a) It helps to feed the cells as they grow.
b) It promotes the replication of the virus.
c) It makes the infected cells easier to visualize.
d) It limits the movement of virus particles.
e) All of the above are correct.

Answer: d

10) To start an experiment, you do an infection by putting 0.5 ml of a virus stock that has a titer of 6×10^7 pfu/ml onto a plate of animal cells that contains 5×10^6 cells. What is the multiplicity of infection for this experiment?

a) 12
b) 6
c) 5
d) 3
e) 1

Answer: b

11) During a single growth cycle experiment, the titer of extracellular and intracellular virus drops in the first hour. What explains this observation?

a) The virus is inactivated by antibodies in the medium.
b) The virus is inactivated by cellular enzymes.
c) The virus enters the cell and is uncoated.
d) The virus binds to the cells in the dish and can't be released.
e) The cell's antiviral defenses prevent replication of the virus

Answer: c

12) What is another term for an RNA-dependent-DNA-polymerase?

a) DNA polymerase
b) RNA polymerase II
c) RNA replicase
d) RNA transcriptase
e) Reverse transcriptase

Answer: e

13) Plant viruses use which cellular structures to spread between host cells?

a) endosomes
b) plasmodesmata
c) plasma membranes
d) vesicles
e) receptors

Answer: b

14) All viruses that use a negative-sense RNA genome must package which of the following proteins in their virion?

a) RNA-dependent-RNA-polymerase
b) matrix protein
c) RNA helicase
d) RNA methylase
e) scaffolding protein

Answer: a

15) Which of the following is a description of a plaque?

a) A viral particle as seen by electron microscopy.
b) A region of dead cells in a monolayer of infected cells.
c) A skin lesion caused by a virus infection in an animal.
d) A button of red blood cells seen in a hemagglutination assay.
e) A region of crystallized virus particles in an infected cell.

Answer: b

16) Which of the following processes in cells was NOT discovered by studying a virus?

a) the sequence of the genetic code.
b) DNA replication in both prokaryotic and eukaryotic cells
c) DNA is the genetic material
d) regulation of gene expression in eukaryotic cells.
e) mRNA splicing in eukaryotic cells

Answer: a

17) You are given a solution of virus and asked to determine the titer. You carry out a plaque assay with 0.5mls of a 10^5 dilution of the virus solution and obtain an average of 150 plaques. What is the titer of the solution?

a) 1.5 x 10^5 pfu/ml
b) 3 x 10^5 pfu/ml
c) 1.5 x 10^7 pfu/ml
d) 3 x 10^7 pfu/ml
e) 1.5 x 10^8 pfu/ml

Answer: d

18) The Baltimore classification system describes the relationship between a viral genome and the:

a) the complementary genome sequence.
b) early viral proteins.
c) early mRNAs.
d) cellular polymerases.
e) Latin classification system.

Answer: c

19) If the genome of a positive-strand RNA virus, which has been purified away from all of the virion proteins, was injected into the cytoplasm of an appropriate host cell, what would happen first?

a) The genome would be copied into complementary negative RNA.
b) The genome would be translated by cellular ribosome's.
c) The genome would be transcribed by a cellular RNA-dependent-RNA-polymerase.
d) The genome would be transcribed by a viral RNA-dependent-RNA-polymerase.
e) None of the above.

Answer: b

20) If the genome of a negative-strand RNA virus, which has been purified away from all of the virion proteins, was injected into the cytoplasm of an appropriate host cell, what would happen first?

a) The genome would be copied into complementary negative RNA.
b) The genome would be translated by cellular ribosome's.
c) The genome would be transcribed by a cellular RNA-dependent-RNA-polymerase.
d) The genome would be transcribed by a viral RNA-dependent-RNA-polymerase.
e) None of the above.

Answer: e
21) Most DNA viruses that replicate in the nucleus of the host cell use which of the following to transcribe their genes into mRNA?

a) cellular DNA-dependent-RNA polymerase
b) viral DNA-dependent-RNA polymerase
c) viral DNA-dependent-DNA polymerase
d) cellular DNA-dependent-DNA polymerase
e) viral RNA-dependent-DNA polymerase

Answer: a

22) The development of which of the following instruments or techniques in the 1930's allowed scientists to visualize viral particles for the first time?

a) polymerase chain reaction
b) electron microscope
c) confocal microscope
d) thermal cycler
e) plaque assay

Answer: b

Question Type: True/False

24) The common cold can be caused by viruses from three different families, some of which have RNA genomes and some of which have DNA genomes.

Answer: True

25) The major advantage of a hemagglutination assay to measure the amount of virus particles in a solution is that it is very accurate.

Answer: False

26) Phages, viruses that can infect bacterial cells, may someday be used to treat bacterial infections.

Answer: True

Question type: Essay

27) The particle to plaque ratio for most animal viruses is much greater than one. What are the reasons why not 100% of animal virus particles, as seen under the electron microscope, can productively infect cells?

Answer: Not all virus particles as seen under the electron microscope are intact virions capable of binding and entering a host cell. Some virus particles contain defective genomes that lack one or more critical genes necessary for viral replication. Some viral particles contain empty capsids, which means that there is not genome inside the virion. Finally, cells have many antiviral defense mechanisms that can shut down a virus infection before it can be completed.

28) Viruses are not the only obligatory intracellular parasites. Describe how the replication of viruses is different than cellular organisms that replicate inside of cells, like chlamydiae and rickettsiae.

Answer: Unicellular parasitic cells that need to replicate inside of other cells do not replicate in the same way that viruses do. First of all, unicellular parasites have their own ribosomes to translate their mRNAs and do not use the host cell ribosomes, like viruses do. In addition they are intact cells that contain their genome entirely within their own cellular membranes and do not release their genome into the host cell, the way that viruses do. These cellular parasites undergo binary fission in the same way that independently living cells do. Viruses do not have their own ribosomes and actually disintegrate their virion, releasing the genome out of the capsid and into the cytoplasm before they begin their replication. They do not undergo binary fission.

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